SULIT NO. KAD PENGENALAN

ANGKA GILIRAN

Nama ..... Tingkatan .....

JABATAN PELAJARAN NEGERI SELANGOR
PERSIDANGAN KEBANGSAAN PENGETUA SEKOLAH MENENGAH

PROGRAM PENINGKATAN PRESTASI AKADEMIK (2)
SIJIL PELAJARAN MALAYSIA 2010

3472/1

ADDITIONAL MATHEMATICS

Kertas 1
Sept./Okt.
2 jam

Dua Jam

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan* **nombor kad pengenalan**, **angka giliran**, **nama** *dan* **tingkatan** *anda pada petak yang disediakan.*

2. *Kertas soalan ini adalah dalam dwibahasa.*

3. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*

4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*

5. *Calon dikehendaki membaca arahan di halaman belakang kertas soalan ini.*

Kod Pemeriksa		
Soalan	Markah Penuh	Markah Diperoleh
1	3	
2	4	
3	3	
4	2	
5	3	
6	3	
7	3	
8	3	
9	3	
10	2	
11	3	
12	3	
13	4	
14	3	
15	3	
16	2	
17	3	
18	4	
19	3	
20	4	
21	4	
22	3	
23	4	
24	4	
25	4	
Jumlah	80	

Kertas soalan ini mengandungi 20 halaman bercetak.

[Lihat halaman sebelah

The following formulae may be helpful in answering the questions. The symbols given are the ones commonly used.

Rumus-rumus berikut boleh membantu anda menjawab soalan. Simbol-simbol yang diberi adalah yang biasa digunakan.

ALGEBRA/*ALGEBRA*

1 $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

2 $a^m \times a^n = a^{m+n}$

3 $a^m \div a^n = a^{m-n}$

4 $(a^m)^n = a^{mn}$

5 $\log_a mn = \log_a m + \log_a n$

6 $\log_a \dfrac{m}{n} = \log_a m - \log_a n$

7 $\log_a m^n = n \log_a m$

8 $\log_a b = \dfrac{\log_c b}{\log_c a}$

9 $T_n = a + (n-1)d$

10 $S_n = \dfrac{n}{2}[2a + (n-1)d]$

11 $T_n = ar^{n-1}$

12 $S_n = \dfrac{a(r^n - 1)}{r - 1} = \dfrac{a(1 - r^n)}{1 - r}, \; r \neq 1$

13 $S_\infty = \dfrac{a}{1 - r}, \; |r| < 1$

CALCULUS / *KALKULUS*

1 $y = uv, \quad \dfrac{dy}{dx} = u\dfrac{dv}{dx} + v\dfrac{du}{dx}$

2 $y = \dfrac{u}{v}, \quad \dfrac{dy}{dx} = \dfrac{v\dfrac{du}{dx} - u\dfrac{dv}{dx}}{v^2}$

3 $\dfrac{dy}{dx} = \dfrac{dy}{du} \times \dfrac{du}{dx}$

4 Area under a curve
Luas di bawah lengkung

$= \int_a^b y \, dx$ or (*atau*)

$= \int_a^b x \, dy$

5 Volume of revolution / *Isi padu kisaran*

$= \int_a^b \pi y^2 \, dx$ or (*atau*)

$= \int_a^b \pi x^2 \, dy$

GEOMETRY / *GEOMETRI*

1 Distance/*Jarak*

$= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

2 Midpoint / *Titik tengah*

$(x, y) = \left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2} \right)$

3 A point dividing a segment of a line
Titik yang membahagi suatu tembereng garis

$(x, y) = \left(\dfrac{nx_1 + mx_2}{m+n}, \dfrac{ny_1 + my_2}{m+n} \right)$

4 Area of triangle / *Luas segi tiga*

$= \dfrac{1}{2}\left| (x_1y_2 + x_2y_3 + x_3y_1) - (x_2y_1 + x_3y_2 + x_1y_3) \right|$

5 $|\underline{\mathbf{r}}| = \sqrt{x^2 + y^2}$

6 $\hat{\underline{\mathbf{r}}} = \dfrac{x\underline{\mathbf{i}} + y\underline{\mathbf{j}}}{\sqrt{x^2 + y^2}}$

STATISTICS / *STATISTIK*

1 $\bar{x} = \dfrac{\sum x}{N}$

2 $\bar{x} = \dfrac{\sum fx}{\sum f}$

3 $\sigma = \sqrt{\dfrac{\sum (x-\bar{x})^2}{N}} = \sqrt{\dfrac{\sum x^2}{N} - \bar{x}^2}$

4 $\sigma = \sqrt{\dfrac{\sum f(x-\bar{x})^2}{\sum f}} = \sqrt{\dfrac{\sum fx^2}{\sum f} - \bar{x}^2}$

5 $m = L + \left(\dfrac{\frac{1}{2}N - F}{f_m}\right)C$

6 $I = \dfrac{Q_1}{Q_0} \times 100$

7 $\bar{I} = \dfrac{\sum W_i I_i}{\sum W_i}$

8 ${}^nP_r = \dfrac{n!}{(n-r)!}$

9 ${}^nC_r = \dfrac{n!}{(n-r)!\,r!}$

10 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

11 $P(X = r) = {}^nC_r p^r q^{n-r}$, $p + q = 1$

12 Mean / *Min*, $\mu = np$

13 $\sigma = \sqrt{npq}$

14 $Z = \dfrac{X - \mu}{\sigma}$

TRIGONOMETRY / *TRIGONOMETRI*

1 Arc length, $s = r\theta$
Panjang lengkok, $s = r\theta$

2 Area of sector, $A = \dfrac{1}{2}r^2\theta$
Luas sektor, $L = \dfrac{1}{2}j^2\theta$

3 $\sin^2 A + \cos^2 A = 1$
$sin^2 A + kos^2 A = 1$

4 $\sec^2 A = 1 + \tan^2 A$
$sek^2 A = 1 + tan^2 A$

5 $\operatorname{cosec}^2 A = 1 + \cot^2 A$
$kosek^2 A = 1 + kot^2 A$

6 $\sin 2A = 2 \sin A \cos A$
$sin\ 2A = 2\ sin\ A\ kos\ A$

7 $\cos 2A = \cos^2 A - \sin^2 A$
$= 2\cos^2 A - 1$
$= 1 - 2\sin^2 A$
$kos\ 2A = kos^2 A - sin^2 A$
$= 2\ kos^2 A - 1$
$= 1 - 2\ sin^2 A$

8 $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$
$sin(A \pm B) = sin\ A\ kos\ B \pm kos\ A\ sin\ B$

9 $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$
$kos(A \pm B) = kos\ A\ kos\ B \mp sin\ A\ sin\ B$

10 $\tan(A \pm B) = \dfrac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$

11 $\tan 2A = \dfrac{2\tan A}{1 - \tan^2 A}$

12 $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

13 $a^2 = b^2 + c^2 - 2bc\cos A$
$a^2 = b^2 + c^2 - 2bc\ kos\ A$

14 Area of triangle / *Luas segi tiga*
$= \dfrac{1}{2}ab\sin C$

[Lihat halaman sebelah
SULIT

For Examiner's Use

2 Given the inverse function $f^{-1}(x)=\frac{2x-3}{2}$, find the value of

Diberi fungsi songsang $f^{-1}(x)=\frac{2x-3}{2}$, *cari nilai*

(*a*) $f(4)$,

(*b*) k if $f^{-1}(2k)=\frac{1}{2}$.

k *jika* $f^{-1}(2k)=\frac{1}{2}$.

[4 *marks*]
[4 *markah*]

Answer / *Jawapan* : (*a*).....

(*b*) k = ...

2

4

3 Given the functions $f:x\to 4x-1$ and $g:x\to 2ax-b$, where a and b are constants.

Diberi fungsi $f:x\to 4x-1$ *dan* $g:x\to 2ax-b$, *dengan keadaan a dan b ialah pemalar.*

Find
Cari

(*a*) $f^2(x)$,

(*b*) the value of a and of b such that if $f^2(x) = g(x)$.
nilai a dan nilai b dengan keadaan jika $f^2(x) = g(x)$.

[3 *marks*]
[3 *markah*]

Answer / *Jawapan* : (*a*) .....

(*b*) a = ...

b = ...

3

3

4 Form a quadratic equation which has the roots 6 and $-\frac{1}{2}$. Give your answer in the general form $ax^2 + bx + c = 0$, where a, b and c are constants. [2 *marks*]

Bentukkan satu persamaan kuadratik yang mempunyai punca-punca 6 *dan* $-\frac{1}{2}$.
Berikan jawapan anda dalam bentuk am $ax^2 + bx + c = 0$, *dengan keadaan a, b dan c adalah pemalar.* [2 *markah*]

4
2

Answer / *Jawapan* : .....

5 Find the range of values of k for which the function $f(x) = x^2 + kx + 2k - 3$ does not intersect the x-axis. [3 *marks*]

Cari julat nilai-nilai k jika fungsi $f(x) = x^2 + kx + 2k - 3$ *tidak bersilang dengan paksi-x.* [3 *markah*]

5
3

Answer / *Jawapan* : .....

For Examiner's Use

6 The quadratic function $f(x) = x^2 + 4x - 1$ can be expressed in the form $f(x) = (x - p)^2 + q$, where p and q are constants.

Fungsi kuadratik $f(x) = x^2 + 4x - 1$ *boleh diungkapkan dalam bentuk* $f(x) = (x - p)^2 + q$, *dengan keadaan p dan q ialah pemalar.*

Find the value of p and of q. [3 *marks*]

Cari nilai p dan nilai q. [3 *markah*]

Answer / *Jawapan* : p = ...

q = ...

6

3

7 Solve the equation :

Selesaikan persamaan :

$$3^{x+3} - 3^{x+2} = 2$$

[3 *marks*]
[3 *markah*]

Answer / *Jawapan* : x = ...

7

3

8 Given that $2^{\log_3 x} = 32$, find the value of x. [3 *marks*]

Diberi $2^{\log_3 x} = 32$, *cari nilai x.* [3 *markah*]

Answer / *Jawapan* : x = ...

8

3

9 Three consecutive terms of a geometric progression are $y - 1$, $y + 3$ and $2y$.
If all the terms are positive, find the common ratio of the progression. [3 *marks*]

Tiga sebutan berturut-turut bagi suatu janjang geometri ialah $y - 1$, $y + 3$ *dan* $2y$.
Jika semua sebutan adalah positif, cari nisbah sepunya janjang itu. [3 *markah*]

9

3

Answer / *Jawapan* : .....

10 9, 27, 54, ... is a geometric progression.
Given that the n^{th} term is 729, find the value of n. [2 *marks*]

9, 27, 54, ... *ialah suatu janjang geometri.*
Diberi sebutan ke-n ialah 729, *cari nilai n.* [2 *markah*]

10

2

Answer / *Jawapan* : n = ...

For Examiner's Use

11 The sum of the first n terms of an arithmetic progression is given by $S_n = 6n - n^2$.
Find the 4th term of the progression. [3 *marks*]

Diberi hasil tambah n sebutan pertama suatu janjang aritmetik ialah $S_n = 6n - n^2$.
Cari sebutan ke-4 janjang itu. [3 *markah*]

Answer / *Jawapan* : .....

11 3

12 Given that $\tan \theta = p$, where p is a constant and $0^\circ < \theta < 90^\circ$.
Diberi tan $\theta = p$, *dengan keadaan p ialah pemalar dan* $0^\circ < \theta < 90^\circ$.

Find in terms of p:
Cari dalam sebutan p:

(*a*) $\cos \theta$,
kos θ,

(*b*) $\sin 2\theta$.

[3 *marks*]
[3 *markah*]

12 3

Answer / *Jawapan* : (*a*) $\cos \theta =$ .....

(*b*) $\sin 2\theta =$ .....

[**Lihat halaman sebelah**
SULIT

13 Diagram 13 shows part of the graph of $\frac{1}{y}$ against x.

Rajah 13 *menunjukkan sebahagian daripada graf* $\frac{1}{y}$ *melawan* x.

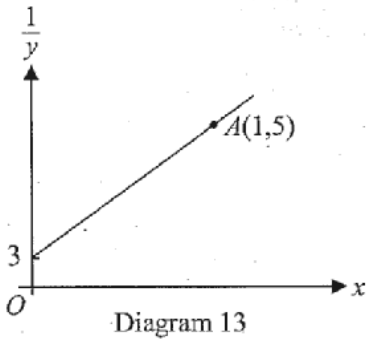

Diagram 13
Rajah 13

The variables x and y are related by the equation $\frac{x}{y} = -kx^2 + \frac{x}{h}$, where h and k are constants.

Pemboleh ubah x dan pemboleh ubah y dihubungkan oleh persamaan $\frac{x}{y} = -kx^2 + \frac{x}{h}$, *dengan keadaan h dan k ialah pemalar.*

Find the value of h and of k. [4 *marks*]

Cari nilai h dan nilai k. [4 *markah*]

13

4

Answer / *Jawapan* : h = ...

k = ...

For Examiner's Use

14 Diagram 14 shows the straight line AC. A point $B(1, 1)$ lies on AC.

Rajah 14 *menunjukkan garis lurus AC. Suatu titik* $B(1, 1)$ *terletak di atas AC.*

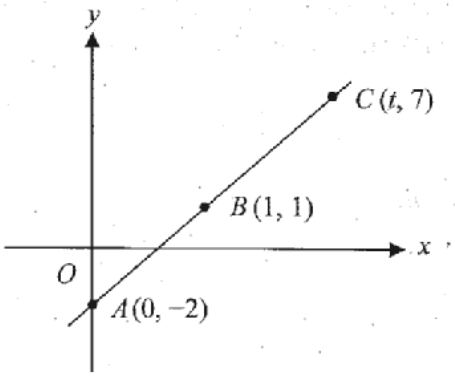

Diagram 14
Rajah 14

(*a*) Find the value of t.
Cari nilai t.

(*b*) A point $P(x, y)$ moves such that $PA = 3$. Find the equation of the locus of P.
Suatu titik $P(x, y)$ *bergerak dengan keadaan* $PA = 3$. *Cari persamaan lokus bagi P.*

[3 *marks*]
[3 *markah*]

Answer / *Jawapan* : (*a*) t = ...

(*b*) .....

14

3

For Examiner's Use

17 Diagram 17 shows a triangle *JKL*.

Rajah 17 *menunjukkan sebuah segi tiga JKL.*

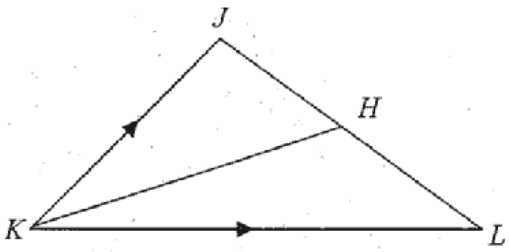

Diagram 17
Rajah 17

JHL is a straight line where $JL = 2JH$. Given $\overrightarrow{KL} = 8\underline{a}$ and $\overrightarrow{KJ} = 6\underline{b}$.

JHL ialah satu garis lurus dengan keadaan $JL = 2JH$. *Diberi* $\overrightarrow{KL} = 8\underline{a}$ *dan* $\overrightarrow{KJ} = 6\underline{b}$.

Express in terms of $\underline{a}$ and $\underline{b}$,

Ungkapkan dalam sebutan $\underline{a}$ *dan* $\underline{b}$,

(*a*) $\overrightarrow{JL}$,

(*b*) $\overrightarrow{KH}$.

[3 *marks*]
[3 *markah*]

Answer / *Jawapan* : (*a*) .....

(*b*) m = ...

17
3

[Lihat halaman sebelah
SULIT

18 Diagram 18 shows a sector *OPQ* with centre *O* and radius of 8·6 cm.

Rajah 18 *menunjukkan sebuah sektor OPQ berpusat O dan berjejari* 8·6 cm.

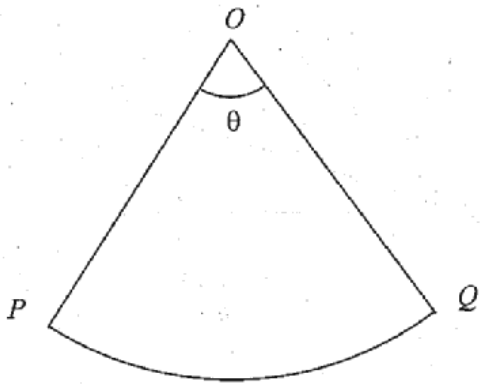

Diagram 18
Rajah 18

Given the area of the sector *OPQ* is 92·45 cm^2.

Diberi luas sektor OPQ ialah 92·45 cm^2.

Find
Cari

(*a*) the value of θ, in radian,
nilai θ, *dalam radian,*

(*b*) the length, in cm, of arc *PQ*.
panjang, dalam cm, *lengkok PQ.*

[4 *marks*]
[4 *markah*]

18

4

Answer / *Jawapan* : (*a*) θ = ...

(*b*) ..... cm

For Examiner's Use

19 The curve $y = 2ax^2 + bx$ has a turning point at (2, 3), where a and b are constants. Find the value of a and of b. [3 marks]

Lengkung $y = 2ax^2 + bx$ *mempunyai titik pusingan di* (2, 3), *dengan keadaan a dan b ialah pemalar. Cari nilai a dan nilai b.* [3 *markah*]

Answer / *Jawapan* : a = ...

b = ...

19

3

20 The equation of a curve $y = \frac{1}{p-x}$, $x \neq p$, where p is a constant, passes through $A(-2, 2)$.

Persamaan suatu lengkung $y = \frac{1}{p-x}$, $x \neq p$, *dengan keadaan p ialah pemalar, melalui* $A(-2, 2)$.

Find
Cari

(a) the value of p,
nilai p,

(b) the gradient of the tangent at the point A.
kecerunan tangen pada titik A.

[4 marks]
[4 *markah*]

20

4

Answer / *Jawapan* : (a) p = ...

(b) .....

[Lihat halaman sebelah SULIT

21 Given that $\int_{-2}^{k} h(x)\,dx = 4$ and $\int_{-2}^{k} \left[\frac{h(x)}{2} - x\right] dx = k$, where k is a constant and $k > -2$.

Diberi $\int_{-2}^{k} h(x)\,dx = 4$ *dan* $\int_{-2}^{k} \left[\frac{h(x)}{2} - x\right] dx = k$, *dengan keadaan k ialah pemalar dan* $k > -2$.

Find
Cari

(*a*) $\int_{k}^{-2} h(x)\,dx$,

(*b*) the value of *k*.
nilai k.

[4 *marks*]
[4 *markah*]

21

4

Answer / *Jawapan* : (*a*) .....

(*b*) k = ...

22 A set of data consists of six numbers. The sum of the numbers is 70 and the sum of the squares of the numbers is 960. A number m is added to the data. The mean of seven numbers is 12.

Satu set data mengandungi enam nombor. Hasil tambah bagi nombor-nombor itu ialah 70 dan hasil tambah bagi kuasa dua nombor-nombor itu ialah 960. Satu nombor m ditambah kepada data ini. Min bagi tujuh nombor itu ialah 12.

Find
Cari

(*a*) the value of *m*,
nilai m,

(*b*) the standard deviation for the seven numbers.
sisihan piawai bagi tujuh nombor itu.

[3 *marks*]
[3 *markah*]

22

3

Answer / *Jawapan* : (*a*) m = ...

(*b*) .....

For Examiner's Use

23 A mathematics test consists of two sections. The number of questions in Section A is 5, whereas the number of questions in Section B is 4.

Satu ujian matematik mengandungi dua bahagian. Bilangan soalan dalam Bahagian A *ialah* 5, *manakala bilangan soalan dalam Bahagian* B *ialah* 4.

Find the number of ways a student can answer the questions in the test if the student must answer

Cari bilangan cara seorang murid boleh menjawab soalan-soalan ujian itu jika murid itu mesti menjawab

(*a*) any 6 questions,
mana-mana 6 *soalan,*

(*b*) 4 questions from Section A and 2 questions from Section B.
4 *soalan daripada Bahagian* A *dan* 2 *soalan daripada Bahagian* B.

[4 *marks*]
[4 *markah*]

Answer / *Jawapan* : (*a*) .....

(*b*) .....

23

4

24 The probability of Siti and of Kumares travelling to London by Air Malaysia is $\frac{2}{3}$ and $\frac{1}{6}$ respectively.

Kebarangkalian Siti dan Kumares pergi ke London menaiki Penerbangan Air Malaysia masing-masing ialah $\frac{2}{3}$ *dan* $\frac{1}{6}$.

Find the probability that
Cari kebarangkalian bahawa

(*a*) neither of them is travelling by Air Malaysia,
kedua-duanya tidak menaiki Penerbangan Air Malaysia,

(*b*) only one of them travel by Air Malaysia.
hanya seorang daripada mereka menaiki Pernebangan Air Malaysia.

[4 *marks*]
[4 *markah*]

24

4

Answer / *Jawapan* : (*a*) .....

(*b*) .....

For Examiner's Use

25 Diagram 25 shows a standard normal distribution graph.
Rajah 25 menunjukkan satu graf taburan normal piawai.

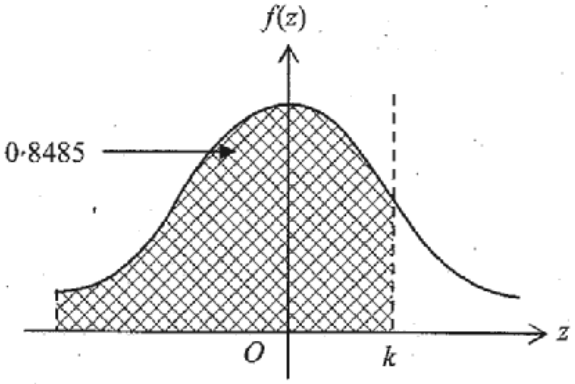

Diagram 25
Rajah 25

The probability represented by the area of the shaded region is 0·8485.
Kebarangkalian yang diwakili oleh luas kawasan berlorek ialah 0·8485.

(*a*) Find the value of *k*.
Cari nilai k.

(*b*) The distances travelled in a certain day by the taxis owned by Berjaya Company is normally distributed. Find the total number of taxis owned by the company when 30 taxis travel with distances in *z*-score more than *k*.
Dalam satu hari tertentu, jarak perjalanan teksi-teksi milik Syarikat Berjaya bertabur secara normal. Cari jumlah teksi yang dimiliki oleh syarikat tersebut apabila jarak perjalanan 30 *buah teksi dalam skor-z melebihi k.*

[4 *marks*]
[4 *markah*]

Answer / *Jawapan* : (*a*) *k* = ...

(*b*) .....

25

4

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1 This question paper consists of **25** questions.
Kertas soalan ini mengandungi **25** *soalan.*

2 Answer **all** questions.
Jawab **semua** *soalan.*

3 Write your answers in the spaces provided in the question paper.
Tulis jawapan anda dalam ruang yang disediakan dalam kertas soalan.

4 Show your working. It may help you to get marks.
Tunjukkan langkah-langkah penting dalam kerja mengira anda.
Ini boleh membantu anda untuk mendapatkan markah.

5 If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.
Sekiranya anda hendak menukar jawapan, batalkan jawapan yang telah dibuat.
Kemudian tulis jawapan yang baru.

6 The diagrams in the questions provided are not drawn to scale unless stated.
Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

7 The marks allocated for each question are shown in brackets.
Markah yang diperuntukkan bagi setiap soalan ditunjukkan dalam kurungan.

8 A list of formulae is provided on page 2 to 3.
Satu senarai rumus disediakan di halaman 2 *hingga* 3.

9 Four-figure mathematical tables are allowed.
Buku sifir matematik empat angka dibenarkan.

10 You may use a non-programmable scientific calculator.
Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.

11 Hand in this question paper to the invigilator at the end of the examination.
Serahkan kertas soalan ini kepada pengawas peperiksaan pada akhir peperiksaan.

JABATAN PELAJARAN NEGERI SELANGOR
PERSIDANGAN KEBANGSAAN PENGETUA SEKOLAH MENENGAH

PROGRAM PENINGKATAN PRESTASI AKADEMIK (2) **3472/2**

SIJIL PELAJARAN MALAYSIA 2010

ADDITIONAL MATHEMATICS

Kertas 2
Sept./Okt.
2½ jam

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini adalah dalam dwibahasa.*
2. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
3. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

Kertas soalan ini mengandungi 20 halaman bercetak.

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HALAMAN KOSONG

The following formulae may be helpful in answering the questions. The symbols given are the ones commonly used.

Rumus-rumus berikut boleh membantu anda menjawab soalan. Simbol-simbol yang diberi adalah yang biasa digunakan.

ALGEBRA

1 $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

2 $a^m \times a^n = a^{m+n}$

3 $a^m \div a^n = a^{m-n}$

4 $(a^m)^n = a^{mn}$

5 $\log_a mn = \log_a m + \log_a n$

6 $\log_a \dfrac{m}{n} = \log_a m - \log_a n$

7 $\log_a m^n = n \log_a m$

8 $\log_a b = \dfrac{\log_c b}{\log_c a}$

9 $T_n = a + (n-1)d$

10 $S_n = \dfrac{n}{2}[2a + (n-1)d]$

11 $T_n = ar^{n-1}$

12 $S_n = \dfrac{a(r^n - 1)}{r - 1} = \dfrac{a(1 - r^n)}{1 - r}, \; r \neq 1$

13 $S_\infty = \dfrac{a}{1 - r}, \; |r| < 1$

CALCULUS
KALKULUS

1 $y = uv, \quad \dfrac{dy}{dx} = u\dfrac{dv}{dx} + v\dfrac{du}{dx}$

2 $y = \dfrac{u}{v}, \quad \dfrac{dy}{dx} = \dfrac{v\dfrac{du}{dx} - u\dfrac{dv}{dx}}{v^2}$

3 $\dfrac{dy}{dx} = \dfrac{dy}{du} \times \dfrac{du}{dx}$

4 Area under a curve
Luas di bawah lengkung

$= \int_a^b y \, dx$ or (*atau*)

$= \int_a^b x \, dy$

5 Volume of revolution
Isi padu kisaran

$= \int_a^b \pi y^2 \, dx$ or (*atau*)

$= \int_a^b \pi x^2 \, dy$

STATISTICS
STATISTIK

1 $\bar{x} = \dfrac{\Sigma x}{N}$

2 $\bar{x} = \dfrac{\Sigma fx}{\Sigma f}$

3 $\sigma = \sqrt{\dfrac{\Sigma (x-\bar{x})^2}{N}} = \sqrt{\dfrac{\Sigma x^2}{N} - \bar{x}^2}$

4 $\sigma = \sqrt{\dfrac{\Sigma f(x-\bar{x})^2}{\Sigma f}} = \sqrt{\dfrac{\Sigma fx^2}{\Sigma f} - \bar{x}^2}$

5 $m = L + \left(\dfrac{\frac{1}{2}N - F}{f_m}\right)C$

6 $I = \dfrac{Q_1}{Q_0} \times 100$

7 $\bar{I} = \dfrac{\sum W_i I_i}{\sum W_i}$

8 ${}^nP_r = \dfrac{n!}{(n-r)!}$

9 ${}^nC_r = \dfrac{n!}{(n-r)!\,r!}$

10 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

11 $P(X = r) = {}^nC_r p^r q^{n-r}$, $p + q = 1$

12 Mean / *Min* , $\mu = np$

13 $\sigma = \sqrt{npq}$

14 $Z = \dfrac{X - \mu}{\sigma}$

GEOMETRY
GEOMETRI

1 Distance / *Jarak*

$= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

2 Midpoint / *Titik tengah*

$(x, y) = \left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2}\right)$

3 A point dividing a segment of a line
Titik yang membahagi suatu tembereng garis

$(x, y) = \left(\dfrac{nx_1 + mx_2}{m+n}, \dfrac{ny_1 + my_2}{m+n}\right)$

4 Area of triangle / *Luas segi tiga*

$= \dfrac{1}{2}\left|(x_1y_2 + x_2y_3 + x_3y_1) - (x_2y_1 + x_3y_2 + x_1y_3)\right|$

5 $\left|\underline{\mathbf{r}}\right| = \sqrt{x^2 + y^2}$

6 $\hat{\underline{\mathbf{r}}} = \dfrac{x\underline{\mathbf{i}} + y\underline{\mathbf{j}}}{\sqrt{x^2 + y^2}}$

TRIGONOMETRY
TRIGONOMETRI

1 Arc length, $s = r\theta$

Panjang lengkok, $s = j\theta$

2 Area of sector, $A = \frac{1}{2} r^2 \theta$

Luas sektor, $L = \frac{1}{2} j^2 \theta$

3 $\sin^2 A + \cos^2 A = 1$

$sin^2 A + kos^2 A = 1$

4 $\sec^2 A = 1 + \tan^2 A$

$sek^2 A = 1 + tan^2 A$

5 $\text{cosec}^2 A = 1 + \cot^2 A$

$kosek^2 A = 1 + kot^2 A$

6 $\sin 2A = 2 \sin A \cos A$

$sin\ 2A = 2\ sin\ A\ kos\ A$

7 $\cos 2A = \cos^2 A - \sin^2 A$
$= 2\cos^2 A - 1$
$= 1 - 2\sin^2 A$

$kos\ 2A = kos^2 A - sin^2 A$
$= 2\ kos^2 A - 1$
$= 1 - 2\ sin^2 A$

8 $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$

$sin(A \pm B) = sin\ A\ kos\ B \pm kos\ A\ sin\ B$

9 $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$

$kos(A \pm B) = kos\ A\ kos\ B \mp sin\ A\ sin\ B$

10 $\tan(A \pm B) = \dfrac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$

11 $\tan 2A = \dfrac{2\tan A}{1 - \tan^2 A}$

12 $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

13 $a^2 = b^2 + c^2 - 2bc\cos A$

$a^2 = b^2 + c^2 - 2bc\ kos\ A$

14 Area of triangle / *Luas segi tiga*
$= \frac{1}{2} ab \sin C$

[Lihat halaman sebelah

Section A
Bahagian A

[40 *marks*]
[40 *markah*]

Answer **all** questions.
Jawab **semua** *soalan.*

1 Solve the simultaneous equations $x-3y=4$ and $y(x+1)=1$.
Give your answers correct to three decimal places. [5 *marks*]

Selesaikan persamaan serentak $x-3y=4$ *dan* $y(x+1)=1$.
Beri jawapan anda betul kepada tiga tempat perpuluhan. [5 *markah*]

2 It is given that function $f(x)=2x^2-3x-5=2(x-\frac{a}{2})^2+\frac{b}{8}-1$, where a and b are constants.

Diberi bahawa fungsi $f(x)=2x^2-3x-5=2(x-\frac{a}{2})^2+\frac{b}{8}-1$ *dengan keadaan a dan b adalah pemalar.*

(*a*) By using the method of completing the square, find the value of a and of b. [4 *marks*]
Dengan menggunakan kaedah penyempurnaan kuasa dua, cari nilai a dan nilai b. [4*markah*]

(*b*) The straight line $y=kx-7$ is a tangent to the curve $y=2x^2-3x-5$.
Find the possible values of k. [3 *marks*]
Garis lurus $y=kx-7$ *ialah tangen kepada lengkung* $y=2x^2-3x-5$.
Carikan nilai-nilai yang mungkin bagi k. [3 *markah*]

3 Diagram 3 shows the arrangement of the first three isosceles triangles, AB_1C, AB_2C and AB_3C of a series of triangles.

Rajah 3 menunjukkan susunan tiga buah segi tiga sama sisi pertama, AB_1C, AB_2C dan AB_3C bagi satu siri segi tiga.

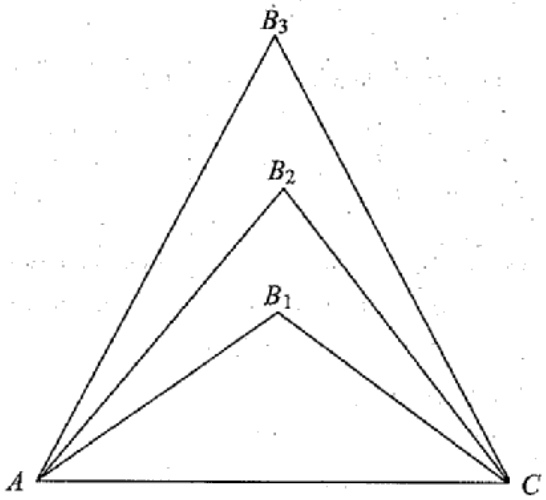


Diagram 3
Rajah 3

The base AC of all the triangles is $2y$ cm. The height of triangle AB_1C is y cm. The height of each subsequent triangle increases by 2 cm.

Tapak AC bagi semua segi tiga ialah $2y$ cm. *Tinggi segi tiga* AB_1C *ialah* y cm. *Tinggi setiap segi tiga berikutnya meningkat sebanyak* 2 cm.

(*a*) Show that the areas of the triangles form an arithmetic progression. [2 *marks*]
Tunjukkan bahawa luas segi tiga-segi tiga itu membentuk satu janjang aritmetik. [2 *markah*]

(*b*) It is given that the area of triangle AB_1C is 25 cm^2.
Diberi bahawa luas segi tiga AB_1C *ialah* 25 cm^2.

Find
Cari

(i) the area of the seventh triangle, AB_7C,
luas segi tiga ketujuh, AB_7C,

(ii) the value of n if the total area of n triangles is 700 cm^2.
nilai n jika jumlah luas n buah segi tiga ialah 700 cm^2.

[5 *marks*]
[5 *markah*]

[Lihat halaman sebelah

4 (a) Prove that $\cos^4 x - \sin^4 x = \cos 2x$. [2 *marks*]
Buktikan $kos^4 x - sin^4 x = kos\, 2x$. [2 *markah*]

(b) (i) Sketch the graph of $y = 2\cos 2x$ for $0 \le x \le 2\pi$.
Lakar graf bagi $y = 2\, kos 2x$ *untuk* $0 \le x \le 2\pi$.

(ii) Hence, using the same axes, sketch a suitable straight line to find the number of solutions for the equation $\frac{3x}{2\pi} = 2(\cos^4 x - \sin^4 x)$ for $0 \le x \le 2\pi$.
State the number of solutions.

Seterusnya, dengan menggunakan paksi yang sama, lakar satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan $\frac{3x}{2\pi} = 2(kos^4 x - sin^4 x)$ *untuk* $0 \le x \le 2\pi$.
Nyatakan bilangan penyelesaian itu.

[6 *marks*]
[6 *markah*]

5 Table 5 shows the marks obtained by 24 candidates in a test.
Jadual 5 menunjukkan markah yang diperoleh 24 orang calon dalam suatu ujian.

Marks ***Markah***	**Number of candidates** ***Bilangan calon***
35 – 39	3
40 – 44	p
45 – 49	8
50 – 54	q
55 – 59	3

Table 5
Jadual 5

(a) Find the value of $p + q$.
Cari nilai $p + q$.

(b) (i) Given that $q = 1$, find the third quartile mark.
Diberi $q = 1$, *cari markah kuartil ketiga.*

(ii) State the modal class.
Nyatakan kelas mod.

[6 *marks*]
[6 *markah*]

6 Diagram 6 shows a triangle OPQ. The diagonals OS and PT intersect at point R. Point S lies on PQ.
Rajah 6 menunjukkan sebuah segi tiga OPQ. Pepenjuru-pepenjuru OS dan PT bersilang di titik R. Titik S terletak pada PQ.

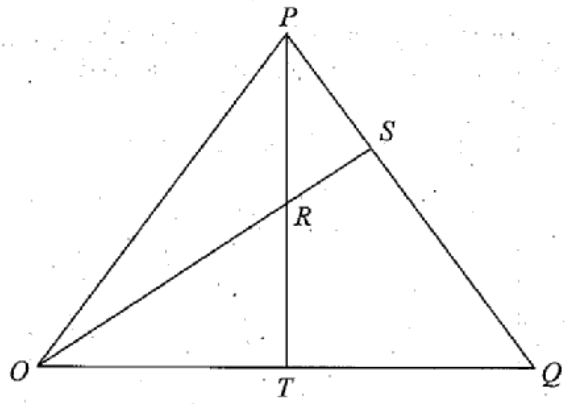


Diagram 6
Rajah 6

It is given that $PS = \frac{1}{3}PQ$, $\overrightarrow{OP} = \underline{x}$, $\overrightarrow{OQ} = \underline{y}$ and T is the midpoint of OQ.

Diberi bahawa $PS = \frac{1}{3}PQ$, $\overrightarrow{OP} = \underline{x}$, $\overrightarrow{OQ} = \underline{y}$ *dan T adalah titik tengah bagi* OQ.

(*a*) Express in terms of $\underline{x}$ and / or $\underline{y}$:
Ungkapkan dalam sebutan $\underline{x}$ *dan / atau* $\underline{y}$:

(i) $\overrightarrow{OT}$,

(ii) $\overrightarrow{OS}$.

[3 *marks*]
[3 *markah*]

(*b*) It is given that $\overrightarrow{OR} = k\overrightarrow{OS}$ and $\overrightarrow{PR} = h\overrightarrow{PT}$, where h and k are constants, find the value of h and of k.

[4 *marks*]

Diberi $\overrightarrow{OR} = k\overrightarrow{OS}$ *dan* $\overrightarrow{PR} = h\overrightarrow{PT}$, *dengan keadaan h dan k ialah pemalar, cari nilai h dan nilai k.*

[4 *markah*]

Section B
***Bahagian* B**

[40 *marks*]
[40 *markah*]

Answer any **four** questions in this section.
Jawab mana-mana **empat** *soalan daripada bahagian ini.*

7 Diagram 7 shows part of the curve $y^2 = x - 2$ and the tangent to the curve at the point K (3, 1).

Rajah 7 menunjukkan sebahagian lengkung $y^2 = x - 2$ *dan tangen kepada lengkung itu pada* K (3, 1).

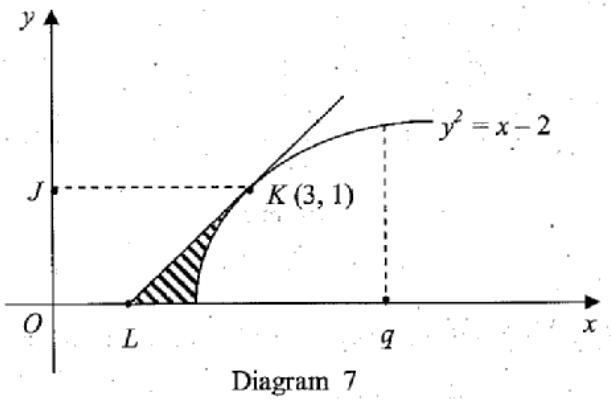


Diagram 7
Rajah 7

It is given that at the point K, $\frac{dy}{dx} = \frac{1}{2}$.

Diberi bahawa pada titik K, $\frac{dy}{dx} = \frac{1}{2}$.

(*a*) Find the coordinates of L. [2 *marks*]
Cari koordinat L. [2 *markah*]

(*b*) Find the area of trapezium $OJKL$ and hence calculate the area of the shaded region.
Cari luas trapezium $OJKL$ *dan seterusnya hitung rantau berlorek.*
[4 *marks*]
[4 *markah*]

(*c*) The region bounded by the curve, the straight line $x = q$ and the x-axis, is revolved through 360° about the x-axis.
If the volume of revolution is $4\frac{1}{2}\pi$ unit^3, find the value of q. [4 *marks*]

Rantau yang dibatasi oleh lengkung itu, garis lurus $x = q$ *dan paksi-x, dikisarkan melalui* 360° *pada paksi-x. Jika isi padu kisaran ialah* $4\frac{1}{2}\pi$ *unit*^{3}*, cari nilai* q. [4 *markah*]

8 Use graph paper to answer this question.
Gunakan kertas graf untuk menjawab soalan ini.

Table 8 shows the values of two variables, x and y, obtained from an experiment. Variables x and y are related by the equation $y = \frac{a^{x^2}}{b}$, where a and b are constants.

Jadual 8 menunjukkan nilai-nilai bagi dua pemboleh ubah, x dan y, yang diperoleh daripada satu eksperimen. Pemboleh ubah x dan y dihubungkan oleh persamaan $y = \frac{a^{x^2}}{b}$, *dengan keadaan a dan b ialah pemalar.*

x	1·0	1·5	2·0	2·3	2·5	2·7
y	3·162	3·981	5·248	6·761	7·763	9·550

Table 8
Jadual 8

(*a*) Based on Table 8, construct a table for the values of x^2 and $\log_{10} y$. [2 *marks*]
Berdasarkan Jadual 8, bina satu jadual bagi nilai-nilai x^2 *dan* $\log_{10} y$. [2 *markah*]

(*b*) Plot $\log_{10} y$ against x^2, using a scale of 2 cm to 1 unit on the x^2-axis and 2 cm to 0·1 unit on the $\log_{10} y$-axis.
Hence, draw the line of best fit. [3 *marks*]

Plot $\log_{10} y$ *melawan* x^2, *dengan menggunakan skala* 2 cm *kepada* 1 *unit pada paksi-*x^2 *dan* 2 cm *kepada* 0·1 *unit pada paksi-*$\log_{10} y$.
Seterusnya, lukis garis lurus penyuaian terbaik. [3 *markah*]

(*c*) Use the graph in **8**(*b*) to find the value of
Gunakan graf di **8**(*b*) *untuk mencari nilai*

(i) *a*,

(ii) *b*.

[5 *marks*]
[5 *markah*]

9 In Diagram 9, *ABE* is a semicircle with centre *O* and radius 5 cm. *ACD* is a sector of a circle with centre *A*.

Dalam Rajah 9, ABE ialah semibulatan berpusat O dan berjejari 5 cm. *ACD ialah sektor sebuah bulatan berpusat A.*

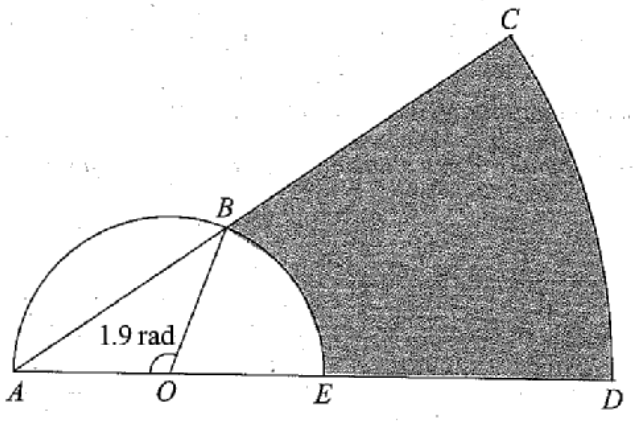


Diagram 9
Rajah 9

It is given that *E* is the midpoint of *AD* and $\angle AOB = 1 \cdot 9$ radians.

Diberi bahawa E ialah titik tengah AD dan $\angle AOB = 1 \cdot 9$ *radian.*

[Use / *Guna* $\pi = 3 \cdot 142$]

Calculate
Hitung

(*a*) $\angle BAO$, in radian. [1 *mark*]
$\angle BAO$, *dalam radian*. [1 *markah*]

(*b*) the perimeter, in cm, of the shaded region. [5 *marks*]
perimeter, dalam cm, *kawasan berlorek.* [5 *markah*]

(*c*) the area, in cm^2, of the shaded region. [4 *marks*]
luas, dalam cm^2, *kawasan berlorek.* [4 *markah*]

10 Solution by scale drawing is not accepted.
Penyelesaian secara lukisan berskala tidak diterima.

The coordinates of points A and B are $(-3, -2)$ and $(0, 2)$ respectively.
Koordinat titik A dan titik B masing-masing ialah $(-3, -2)$ *dan* $(0, 2)$.

(*a*) Given that the equation of AB is $\frac{x}{k}+\frac{y}{2}=1$.
Find the value of k. [1 *mark*]

Diberi persamaan AB ialah $\frac{x}{k}+\frac{y}{2}=1$.
Cari nilai k. [1 *markah*]

(*b*) The straight line AB is extended to a point C such that $AB : AC = 1 : 4$.
Find the coordinates of C. [2 *marks*]

Garis lurus AB dipanjangkan ke suatu titik C dengan keadaan $AB : AC = 1 : 4$.
Cari koordinat C. [2 *markah*]

(*c*) Find the equation of the perpendicular bisector of the straight line AC. [4 *marks*]
Cari persamaan pembahagi dua sama serenjang bagi garis lurus AC. [4 *markah*]

(*d*) A point $P(x, y)$ moves such that its distance from point A is always $1\frac{1}{3}$ units.
Find the equation of the locus of P. [3 *marks*]

Suatu titik $P(x, y)$ *bergerak dengan keadaan jaraknya dari titik A adalah sentiasa* $1\frac{1}{3}$ *unit.*
Cari persamaan lokus P. [3 *markah*]

11 (*a*) The result of a survey in an urban area shows that the probability of a student having a mobile phone is p.
The mean and variance of n students chosen at random having a mobile phone are 720 and 144 respectively.

Keputusan suatu tinjauan di kawasan bandar menunjukkan bahawa kebarangkalian seorang pelajar mempunyai telefon bimbit adalah p.
Min dan varians bagi n pelajar yang dipilih secara rawak masing-masing ialah 720 *dan* 144.

Find the value of n and of p.
Cari nilai n dan nilai p.

[5 *marks*]
[5 *markah*]

(*b*) The life-span of a housefly is normally distributed with a mean of 28 days and a standard deviation of 3 days.
Jangka hayat seekor lalat bertaburan secara normal dengan min 28 *hari dan sisihan piawai* 3 *hari.*

(i) If a housefly is chosen at random, calculate the probability that its life-span is between 25 days and 30 days.
Jika seekor lalat dipilih secara rawak, hitungkan kebarangkalian seekor lalat mempunyai jangka hayat antara 25 *hari dan* 30 *hari.*

(ii) Given that 10 % of houseflies have life-span of more than m days, find the value of m.
Diberi 10 % *daripada lalat mempunyai jangka hayat melebihi m hari, cari nilai m.*

[5 *marks*]
[5 *markah*]

Section C
Bahagian C

[20 *marks*]
[20 *markah*]

Answer any **two** questions from this section.
Jawab mana-mana **dua** *soalan daripada bahagian ini.*

12 Diagram 12 shows a triangle ABC.
Rajah 12 menunjukkan sebuah segi tiga ABC.

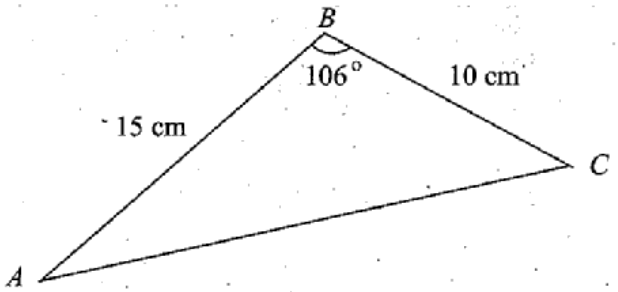


Diagram 12
Rajah 12

(*a*) Calculate
Hitung

(i) the length, in cm, of AC,
panjang, dalam cm, *bagi* AC,

(ii) $\angle ACB$.

[5 *marks*]
[5 *markah*]

(*b*) Point C' lies on AC such that $BC' = BC$.
Titik C' *terletak pada* AC *dengan keadaan* $BC' = BC$.

(i) Sketch $\Delta ABC'$. Hence, calculate $\angle AC'B$.
Lakar $\Delta ABC'$. *Seterusnya, hitung* $\angle AC'B$.

(ii) Calculate the area, in cm^2, of $\Delta ABC'$.
Hitung luas, dalam cm^2, *bagi* $\Delta ABC'$.

[5 *marks*]
[5 *markah*]

13 Table 13 shows the prices and price indices for four types of sports equipment.
Diagram 13 is a pie chart which represents the relative expenditure of the equipment.

Jadual 13 *menunjukkan harga dan indeks harga bagi empat jenis peralatan sukan.*
Rajah 13 *ialah carta pai yang mewakili perbelanjaan relatif bagi empat jenis peralatan itu.*

Sports Equipment ***Peralatan Sukan***	**Price (RM) for the year** ***Harga* (RM) *pada tahun***		**Price index for the year 2009 based on the year 2007** ***Indeks harga pada tahun* 2009 *berasaskan tahun* 2007**
	2007	**2009**	
P	400	520	130
Q	1500	*m*	120
R	800	1200	150
S	*n*	900	80

Table 13
Jadual 13

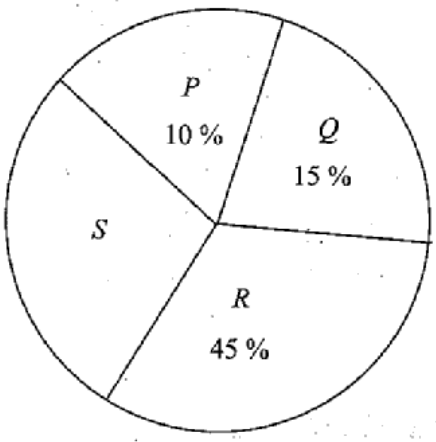


Diagram 13
Rajah 13

(*a*) Find the value of *m* and of *n*. [3 *marks*]
Cari nilai m dan nilai n. [3 *markah*]

(*b*) Calculate the composite index for the cost of the equipment in the year 2009 based on the year 2007.

Hitung indeks gubahan bagi kos peralatan tersebut pada tahun 2009 *berasaskan tahun* 2007.

[3 *marks*]
[3 *markah*]

(c) The composite index for the cost of the equipment increases by 40 % from the year 2009 to the year 2011.

Indeks gubahan bagi kos peralatan tersebut meningkat 40 % *dari tahun* 2009 *ke tahun* 2011.

Calculate
Hitung

(i) the composite index for the cost of the equipment in the year 2011 based on the year 2007,
indeks gubahan bagi jumlah kos peralatan tersebut pada tahun 2011 *berasaskan tahun* 2007,

(ii) the total cost of the equipment in the year 2011 if its corresponding total cost in the year 2007 is RM1 450.
jumlah kos peralatan tersebut pada tahun 2011 *jika jumlah kos yang sepadan pada tahun* 2007 *ialah* RM1 450.

[4 *marks*]
[4 *markah*]

14 Use graph paper to answer this question.
Gunakan kertas graf untuk menjawab soalan ini.

Isma earns a salary of RM3 000 a month. She spends RM x on transport and RM y on food. The expenditure in a month is based on the following constraints:

Isma memperoleh gaji sebanyak RM3 000 *sebulan. Perbelanjaan bulanannya untuk pengangkutan adalah* RM x *dan perbelanjaan bulanannya untuk makanan adalah* RM y. *Perbelanjaannya dalam sebulan adalah berdasarkan kekangan berikut:*

I: The monthly expenditure on food is at most three times the monthly expenditure on transport.
Perbelanjaan bulanan untuk makanan adalah selebih-lebihnya tiga kali perbelanjaan bulanan untuk pengangkutan.

II: The monthly expenditure on food is at least RM50 more than the monthly expenditure on transport.
Perbelanjaan bulanan untuk makanan adalah sekurang-kurangnya RM50 *lebih daripada perbelanjaan bulanan untuk pengangkutan.*

III: The monthly expenditure on transport and food does not exceed one third of her monthly salary.
Perbelanjaan bulanan untuk pengangkutan dan makanan tidak melebihi satu pertiga daripada gaji bulanan.

(a) Write three inequalities, other than $x \geq 0$ and $y \geq 0$, which satisfy all the above constraints.
Tulis tiga ketaksamaan, selain $x \geq 0$ *dan* $y \geq 0$, *yang memenuhi semua kekangan di atas.*

[3 *marks*]
[3 *markah*]

(b) Using a scale of 2 cm to RM100 on both axes, construct and shade the region R that satisfies all the above constraints.

Menggunakan skala 2 cm *kepada* RM100 *pada kedua-dua paksi, bina dan lorek rantau R yang memenuhi semua kekangan di atas.*

[3 *marks*]
[3 *markah*]

(c) Using the graph constructed in **14**(b), find
Menggunakan graf yang dibina di **14**(b), *cari*

(i) the maximum monthly expenditure on food if she spends RM240 a month on transport.
perbelanjaan bulanan maksimum untuk makanan jika dia membelanjakan RM240 *sebulan untuk pengangkutan.*

(ii) the minimum total monthly expenditure on transport and food.
jumlah perbelanjaan bulanan yang minimum untuk pengangkutan dan makanan.

[4 *marks*]
[4 *markah*]

15 A particle moves along a straight line and passes through a fixed point O. Its velocity, v m s^{-1}, is given by $v = 2t^2 - t - 6$, where t is the time, in seconds, after passing through O. The particle stops instantaneously at a point M.

Suatu zarah bergerak di sepanjang suatu garis lurus dan melalui satu titik tetap O. Halajunya, v m s^{-1}, diberi oleh $v = 2t^2 - t - 6$, dengan keadaan t ialah masa, dalam saat, selepas melalui O. Zarah itu berhenti seketika di suatu titik M.

[Assume motion to the right is positive.]

[*Anggapkan gerakan ke arah kanan sebagai positif.*]

Find

Cari

(*a*) the acceleration, in m s^{-2}, of the particle at M, [3 *marks*]
pecutan, dalam m s^{-2}, *bagi zarah itu di M,* [3 *markah*]

(*b*) the minimum velocity, in m s^{-1}, of the particle, [3 *marks*]
halaju minimum, dalam m s^{-1}, *bagi zarah itu,* [3 *markah*]

(*c*) the total distance, in m, travelled by the particle in the first 3 seconds. [4 *marks*]
jumlah jarak, dalam m, *yang dilalui oleh zarah itu dalam* 3 *saat pertama.* [4 *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of three sections: **Section A, Section B** and **Section C**.
Kertas soalan ini mengandungi tiga bahagian: **Bahagian A, Bahagian B** *dan* **Bahagian C**.

2. Answer **all** questions in **Section A**, **four** questions from **Section B** and **two** questions from **Section C**.
Jawab **semua** *soalan dalam* **Bahagian A, empat** *soalan daripada* **Bahagian B** dan **dua** *soalan daripada* **Bahagian C**.

3. Show your working. It may help you to get marks.
Tunjukkan langkah-langkah penting dalam kerja mengira anda. Ini boleh membantu anda untuk mendapatkan markah.

4. The diagrams in the questions are not drawn to scale unless stated.
Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

5. The marks allocated for each question and sub-part of a question are shown in brackets.
Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.

6. A list of formulae is provided on pages 3 to 5.
Satu senarai rumus disediakan di halaman 3 *hingga* 5.

7. Graph paper and a booklet of four-figure mathematical tables are provided.
Kertas graf dan sebuah sifir matematik empat angka dibenarkan.

8. You may use a non-programmable scientific calculator.
Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.

PROGRAM PENINGKATAN PRESTASI AKADEMIK **3472/1**

SIJIL PELAJARAN MALAYSIA 2010

Matematik Tambahan

Kertas 1

SKEMA JAWAPAN
PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2010

MATEMATIK TAMBAHAN

Kertas 1

PERATURAN PEMARKAHAN

UNTUK KEGUNAAN PEMERIKSA SAHAJA

Peraturan Pemarkahan ini mengandungi **4** halaman bercetak

1	(*a*) $t = -\frac{3}{2}$ (*b*) $0 \le f(x) \le 13$	**1** **2**	6	$p = -2$ and $q = -5$ $p = -2$ or $q = -5$ $(x+2)^2 - 5$	**3** B2 B1
2	(*a*) $f(4) = \frac{11}{2}$ $4 = \frac{2x-3}{2}$ (*b*) $k = 1$ $\frac{2(2k)-3}{2} = \frac{1}{2}$	**2** B1 **2** B1	7	$x = -2$ $3^x = \frac{1}{9}$ $3^x \cdot 3^3 - 3^x \cdot 3^2$ or equivalent	**3** B2 B1
3	(*a*) $16x - 5$ $4(4x-1) - 1$ (*b*) $a = 8$ and $b = 5$ $a = 8$ or $b = 5$	**1** **2** B1	8	$x = 243$ $\log_3 x = 5$ $2^{\log_3 x} = 2^5$	**3** B2 B1
4	$2x^2 - 11x - 6 = 0$ $(x-6)(x+\frac{1}{2}) = 0$ or equivalent	**2** B1	9	$\frac{3}{2}$ $y = 9$ or G.P : 8, 12, 18 $y^2 - 8y - 9 = 0$ or $\frac{y+3}{y-1} = \frac{2y}{y+3}$	**3** B2 B1
5	$2 < k < 6$ $(k-2)(k-6) < 0$ $k^2 - 4(1)(2k-3) < 0$	**3** B2 B1	10	$n = 5$ $9(3)^{n-1} = 729$	**2** B1

11	–1 [8] – [9] S_4 = [24-16] or equivalent OR S_3 = [18 – 9] or equivalent	**3** B2 B1	15	(*a*) 1 : 2 $\frac{7m+n}{m+n}=3$ (*b*) 4	**2** B1 **1**
12	(*a*) $\cos\theta=\frac{1}{\sqrt{p^2+1}}$ (*b*) $\frac{2p}{1+p^2}$ $2\left(\frac{p}{\sqrt{p^2+1}}\right)\left(\frac{1}{\sqrt{p^2+1}}\right)$ or equivalent	**1** **2** B1	16	8 $\lambda(4\underline{a}+6\underline{b})=(m-2)\underline{a}+9\underline{b}$, $\frac{6}{4}=\frac{9}{m-2}$ or equivalent	**2** B1
13	$h=\frac{1}{3}$ and $k=-2$ $h=\frac{1}{3}$ or $k=-2$ $\frac{1}{h}=3$ *or* $-k=2$ gradient = 2 or $\frac{1}{y}=-kx+\frac{1}{h}$	**4** B3 B2 B1	17	(*a*) $8\underline{a}-6\underline{b}$ (*b*) $4\underline{a}+3\underline{b}$ $\overline{KH}=6\underline{b}+\frac{1}{2}(-6\underline{b}+8\underline{a})$ or equivalent	**1** **2** B1
14	(*a*) 3 (*b*) $x^2+y^2+4y-5=0$ $\sqrt{x^2+(y+)^2}=3$	**1** **2** B1	18	(*a*) 2. 5 radian $\frac{1}{2}(8.6)^2\theta=92.45$ (*b*) 21.5cm 8.6×2.5	**2** B1 **2** B1

19	$a = -\frac{3}{8}$ and $b = 3$ $8a + 2b = 3$ or $8a + b = 0$ $4ax + b = 0$	**3** B2 B1	23	(*a*) 84 (*b*) 30 ${}^5C_4 \times {}^4C_2$ ${}^5C_4$ *or* ${}^4C_2$	**1** **3** B2 B1
20	(*a*) $p = -\frac{3}{2}$ $2 = \frac{1}{p+2}$ (*b*) 4 $\frac{dy}{dx} = \frac{1}{(p-x)^2}$	**2** B1 **2** B1	24	(*a*) $\frac{5}{18}$ (*b*) $\frac{11}{18}$ $\frac{2}{3} \times \frac{5}{6} + \frac{1}{3} \times \frac{1}{6}$ $\frac{2}{3} \times \frac{5}{6}$ or $\frac{1}{3} \times \frac{1}{6}$	**1** **3** B2 B1
21	(*a*) -4 (*b*) $k = 2$ $(k+4)(k-2) = 0$ or $\frac{1}{2} \times 4 - \left[\frac{k^2}{2} - \frac{(-2)^2}{2}\right] = k$ $\frac{1}{2} \times 4$ *or* $\left[\frac{x^2}{2}\right]_{-2}^{k}$	**1** **3** B2 B1	25	(*a*) $k = 1.03$ $P(z > k) = 1 - 0.8485$ (*b*) 198 $\frac{30}{n} = 0.1515$	**2** B1 **2** B1
22	(*a*) $m = 14$ (*b*) std deviation = 4.598 $\sqrt{\frac{1156}{7} - 12^2}$	**1** **2** B1			

PROGRAM PENINGKATAN PRESTASI AKADEMIK **3472/2**

SIJIL PELAJARAN MALAYSIA 2010

Matematik Tambahan
Kertas 2

SKEMA JAWAPAN
PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2010

MATEMATIK TAMBAHAN

Kertas 2

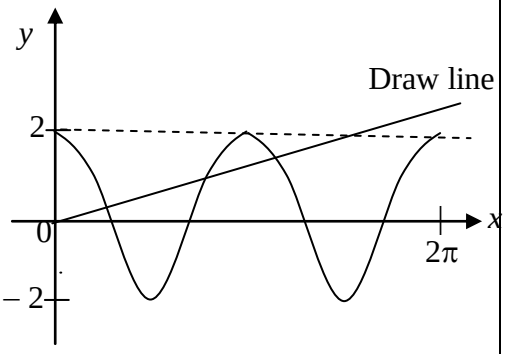
PERATURAN PEMARKAHAN

UNTUK KEGUNAAN PEMERIKSA SAHAJA

Solution	Marks
1 $x = 4 + 3y$ or $y = \dfrac{x-4}{3}$	P1
$y(4+3y+1) = 1$ or $\dfrac{x-4}{3}(x+1) = 1$	K1
$3y^2 + 5y - 1 = 0$ or $x^2 - 3x - 7 = 0$	
$y = \dfrac{-5 \pm \sqrt{25 - 4(3)(-1)}}{2(3)}$	K1
$x = 4.542, -1.542$	N1
$y = 0.181, -1.847$	N1
	5

Solution	Marks
2(*a*) $y = 2\left[x^2 - \dfrac{3}{2}x - \dfrac{5}{2}\right]$	K1
$= 2\left[(x - \dfrac{3}{4})^2 - \dfrac{9}{16} - \dfrac{5}{2}\right]$	
$= 2(x - \dfrac{3}{4})^2 - \dfrac{49}{8}$	
$\dfrac{a}{2} = \dfrac{3}{4}$ or $\dfrac{-49}{8} = \dfrac{b}{8} - 1$	K1
$a = \dfrac{3}{2}$	N1
$b = -41$	N1
(*b*) $2x^2 + (-3-k)x + 2 = 0$	K1
$(-3-k)^2 - 4(2)(2) = 0$	K1
$k^2 + 6k - 7 = 0$	N1
$(k-1)(k+7) = 0$	
$k = 1, -7$	**7**

Solution	Marks
3(*a*) y^2 , $y^2 + 2y$, $y^2 + 4y$	K1
$T_2 - T_1 = 2y, T_3 - T_2 = 2y$	
Since $T_2 - T_1 = T_3 - T_2 = 2y$,then A.P	N1
(*b*)	
i) $T_7 = 25 + 6(10)$	K1
$= 85$	N1
ii) $700 = \dfrac{n}{2}[2(25) + (n-1)10]$	K1
$(n-10)(n+14) = 0$	K1
$n = 10$	N1
	7

Solution	Marks
4 (*a*) LHS = $\cos^4 x - \sin^4 x$	K1
$= (\cos^2 x + \sin^2 x)(\cos^2 x - \sin^2 x)$	
$= 1(\cos 2x)$	N1
$= \cos 2x$	
(*b*) 	K1
Shape of graph cos *x*	P1
2 cycles	P1
max = 2 and min = –2 within $0 \le x \le 2\pi$	P1
$y = \dfrac{3x}{2\pi}$	N1
Number of solutions = 3	N1
	8

5 (*a*) $3 + p + 8 + q + 3 = 24$ K1
$p + q = 10$ N1

(*b*)(i) $p = 9$ P1

$Q_3 = 44.5 + \frac{6}{8} \times 5$ K1
$= 48.25$ N1

Modal class = 40 – 44 P1

6

7(*a*)

$\frac{1-0}{3-x} = \frac{1}{2}$ K1
$x = 1$ N1
L(1, 0)

(*b*) $A_{trapezium} = \frac{1}{2}(1+3)(1) = 2$ unit^2 K1

A1 $= \int_0^1 (y^2 + 2)dy = \left[\frac{y^3}{3} + 2y\right]_0^1$ K1
$= \frac{1}{3} + 2$ K1 (limit)
$= \frac{7}{3}$ unit^2

Area $= \frac{7}{3} - 2 = \frac{1}{3}$ unit^2 N1

(*c*) $V = \pi\int_2^q (x-2)dx = \pi\left[\frac{x^2}{2} - 2x\right]_2^q$ K1

$\frac{9}{2}\pi = \pi\left[\frac{q^2}{2} - 2q - (2-4)\right]$ K1

$q^2 - 4q - 5 = 0$ KI
$(q - 5)(q + 1) = 0$ N1

$q = 5$ only

10

6(*a*) i) $\overrightarrow{OT} = \frac{1}{2}\overrightarrow{OQ}$

$= \frac{1}{2}\underline{y}$ N1

ii) $\overrightarrow{OS} = \overrightarrow{OP} + \overrightarrow{PS}$

$= \underline{x} + \frac{1}{3}(\overrightarrow{PO} + \overrightarrow{OQ})$ K1

$= \underline{x} - \frac{1}{3}\underline{x} + \frac{1}{3}\underline{y}$

$= \frac{2}{3}\underline{x} + \frac{1}{3}\underline{y}$ N1

(*b*) $\overrightarrow{PR} = h\overrightarrow{PT}$

$\overrightarrow{PO} + \overrightarrow{OR} = h(\overrightarrow{PO} + \overrightarrow{OT})$ K1

$-\underline{x} + k(\frac{2}{3}\underline{x} + \frac{1}{3}\underline{y}) = -h\underline{x} + \frac{1}{2}h\underline{y}$

$\frac{-3+2k}{3} = -h$, $\frac{1}{3}k = \frac{1}{2}h$

$\frac{3-2k}{3} = \frac{2}{3}k$ K1

$k = \frac{3}{4}$ N1

$h = \frac{1}{2}$ N1

7

8(*a*)

x^2	1	2.25	4	5..29	6.25	7.29
$\log_{10} y$	0.5	0.6	0.72	0.83	0.89	0.98

N1
N1

(*b*) Refer to the graph
Correct & consistant scale and plot at least 1 point correctly K1
All 6 points plotted correctly N1
Line of best fit N1

P1

(*c*) i) $\log_{10} y = x^2 \log_{10} a - \log_{10} b$ K1

$\log_{10} a = \frac{0.98 - 0.5}{7.3 - 1}$ N1

$a = 1.1918$

ii) $-\log_{10} b = 0.425$ K1
$b = 0.3758$ N1

10

9(*a*) $\angle BAO = \dfrac{3.142 - 1.9}{2} = 0.621 rad$ P1

(*b*) $\cos 35.58^\circ = \dfrac{AB}{10}$ K1

AB = 8.133 cm P1

BC = 20 – 8.133 = 11.867 K1

$S_{BE} = 5(3.142 - 1.9) = 6.21cm$ or

$S_{CD} = 20(0.621) = 12.42cm$ K1

Perimeter = 10+ 6.21+ 12.42 + 11.867 N1

= 40.497 cm

(*c*) $A_{sector} = \dfrac{1}{2} \times 20^2 \times 0.621 = 124.2cm^2$ K1

or

$\dfrac{1}{2} \times 5^2 \times 1.242 = 15.525cm^2$ K1

$A_{triangle} = \dfrac{1}{2}(5^2)\sin 108.8^\circ = 11.83cm^2$ K1

Area = 124.2 – 15.525 – 11.83 N1

= 96.845 cm^2

10

10 (*a*) $\dfrac{-3}{k} - \dfrac{2}{2} = 1, k = -\dfrac{3}{2}$ N1

(*b*) $\dfrac{-3(3) + x}{4} = 0, \dfrac{-2(3) + y}{4} = 2$ K1

$C(9,14)$ N1

(*c*) Midpoint (3, 6) P1

$m = \dfrac{-1}{4/3} = -\dfrac{3}{4}$ K1

$y - 6 = \dfrac{-3}{4}(x - 3)$ K1

$y = \dfrac{-3}{4}x + \dfrac{33}{4}$ N1

(*d*) $\sqrt{(x+3)^2 + (y+2)^2}$ K1

$\sqrt{(x+3)^2 + (y+2)^2} = \dfrac{4}{3}$ K1

$9x^2 + 9y^2 + 54x + 36y + 101 = 0$ N1

10

11(*a***)**

$144 = 720q$

$q = \frac{1}{5}, p = \frac{4}{5}$ K1

$720 = n(\frac{4}{5})$ N1N1

$n = 900$ K1 N1

(*b*) $X \sim N(28, 3^2)$

i) $P(25 \le X \le 30)$

$= P\left(\frac{25-28}{3} \le Z \le \frac{30-28}{3}\right)$ K1

$= P(-1 \le Z \le 0.6667)$ K1N1

$= 1 - (0.1587 + 0.2525)$

$= 0.5888$ or 0.589

(ii) $P(X > m) = 0.1$

$P\left(Z > \frac{m-28}{3}\right) = 0.1$ K1

$\left(\frac{m-28}{3}\right) = 1.282$ N1

$m = 31.846$

(accept $m = 32$)

10

12 (*a*)(i)

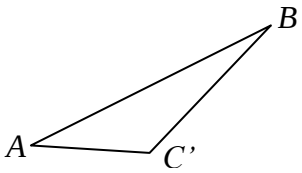
$AC^2 = 15^2 + 10^2 - 2(15)(10)\cos 106^\circ$ K1

$AC = 20.1914$ N1

(ii) $\frac{15}{\sin \angle ACB} = \frac{20.1914}{\sin 106^\circ}$ K1

$\angle ACB = 45.57^\circ$ N1

(*b*)i)



P1

$\angle BC'A = 180^\circ - 45.57^\circ = 134.43^\circ$ K1N1

(ii)

$\angle ABC' = 106^\circ - [180^\circ - 2(45.57°)]$ P1

$= 17.14°$

$Area\ \Delta ABC' = \frac{1}{2}(15)(10)\sin 17.14^\circ$ K1

$= 22.1031$ N1

10

13 (*a*) $\frac{m}{1500}\times 100 = 120$ — K1

$m = 1800$ — N1

OR

$\frac{900}{n}\times 100 = 80$ — N1

$n = 1125$

(*b*)

$\frac{(130\times 10 + 120\times 15 + 150\times 45 + 80\times 30)}{100}$ — K1

$= \frac{122500}{100}$ — N1

$= 122.5$ — N1

(*c*)(i) $\breve{I}_{\frac{2011}{2007}} = \frac{140\times 122.5}{100}$ — K1

$= 171.5$ — N1

(*c*)(ii) $\frac{P\times 100}{1450} = 171.5$ — K1

P = RM 2486.75 — N1

10

14 (*a*) $y \le 3x$ — N1

$y \ge x + 50$ — N1

$x + y \le 1000$ — N1

(*b*) Refer to graph

Draw at least one line correctly — K1

Draw all the lines correctly — N1

Correct region — N1

(*c*) (i) RM 720 — N1

(ii) (25, 75) — N1

Using $x + y = k$ on any point in the region — K1

RM 100 — N1

10

15 (*a*) when $v = 0$,

$(2t + 3)(t - 2) = 0$ — K1

$t = 2$

$a = 4t - 1$ — K1

$= 4(2) - 1$

$= 7 \text{ m s}^{-2}$ — N1

(*b*) $a = 4t - 1 = 0$ — K1

$t = \frac{1}{4}s$

$v = 2(\frac{1}{4})^2 - (\frac{1}{4}) - 6$ — K1

$v = -6\frac{1}{8}\text{ms}^{-1}$ — N1

15 (*c*)

$s = \int (2t^2 - t - 6)dt$ — K1

$= \frac{2t^3}{3} - \frac{t^2}{2} - 6t$

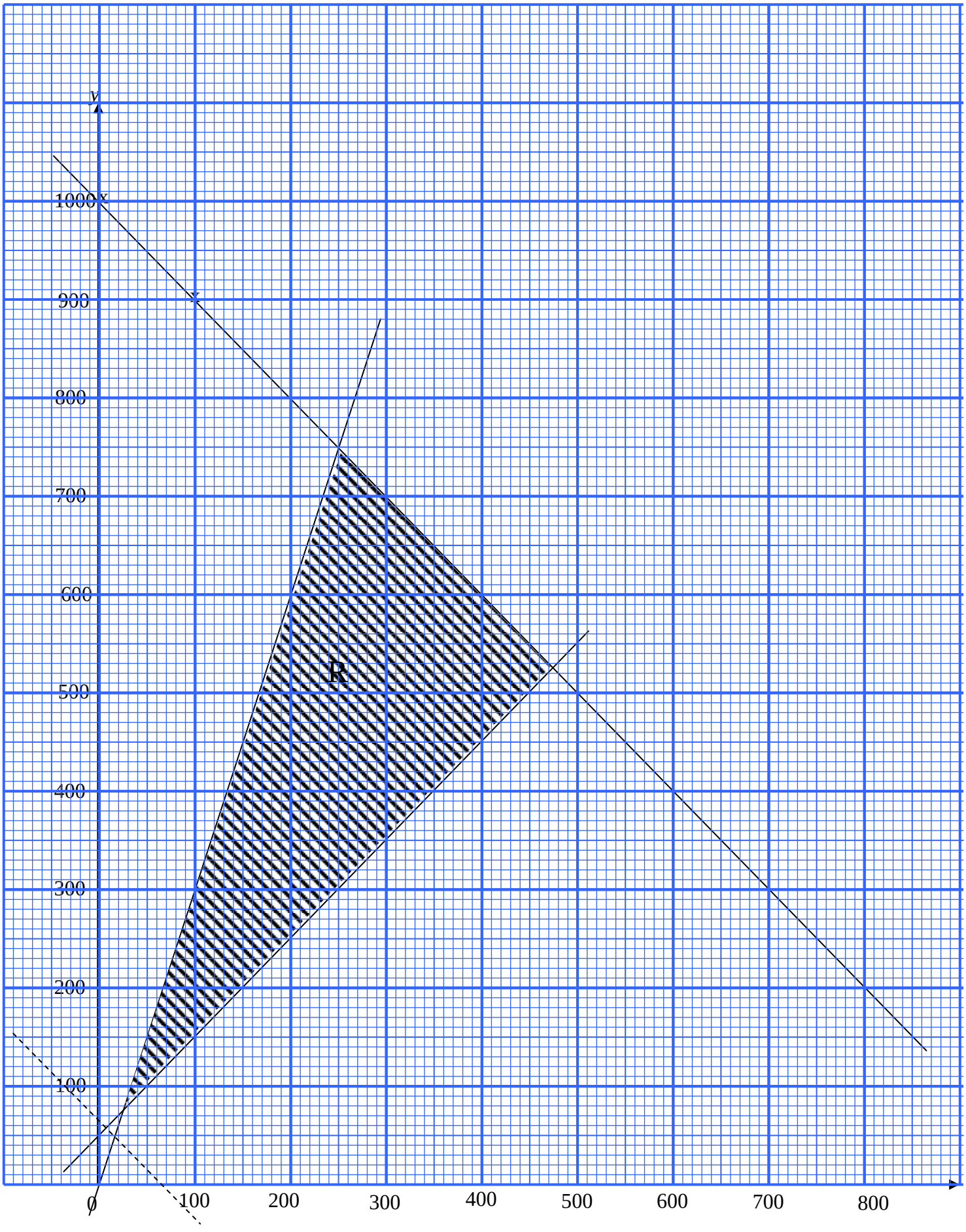
$S_2 = \frac{16}{3} - 2 - 12 = -8\frac{2}{3}$ — K1

$S_3 = 18 - \frac{9}{2} - 18 = -4\frac{1}{2}$ — K1

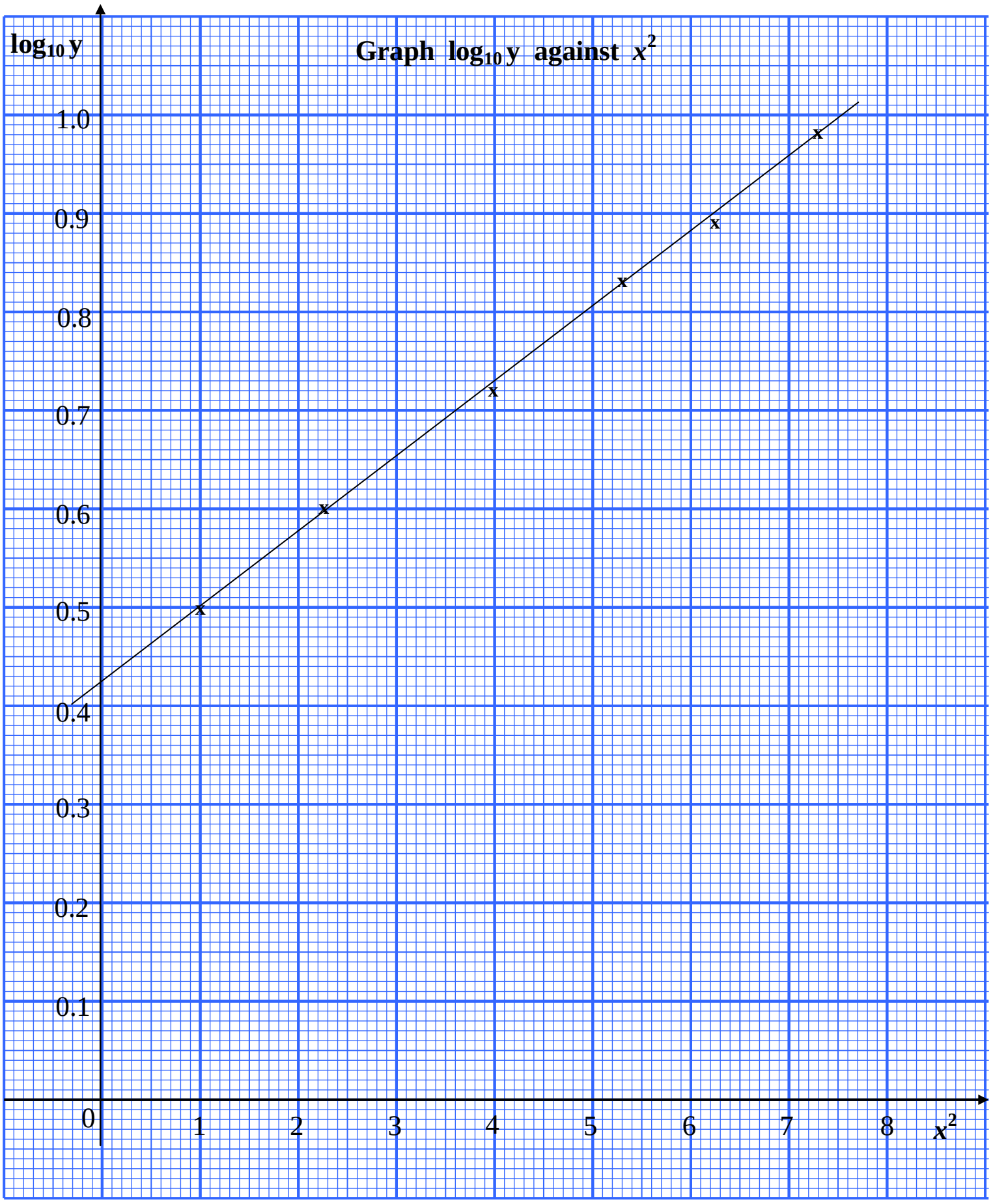
$d = 8\frac{2}{3} - [-8\frac{2}{3} - (-4\frac{1}{2})] = 12\frac{5}{6}\text{m}$ — N1

10

Graph for Question 15



Question 8


log10 y
Graph log10 y against x2
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1
2
3
4
5
6
7
8
x2